

## A Thermal Switch for Space Applications, Phase I

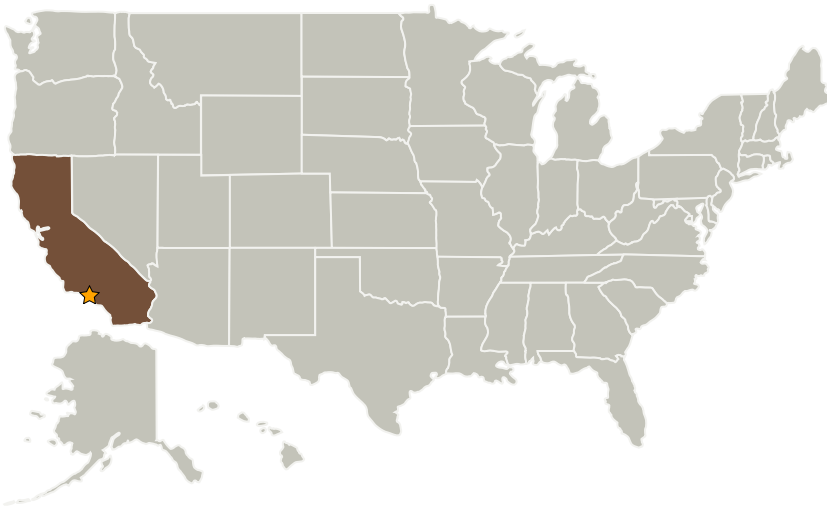
Completed Technology Project (2008 - 2008)



## Project Introduction

Various planned NASA missions require thermal switches for active thermal control. As an example cryocoolers, including redundant coolers are incorporated on select missions. The redundant coolers operate when deteriorating or defunct coolers are deactivated. However, integration of redundant coolers may cause substantial parasitic heat loads unless the cold regions are thermally connected to the active cryocooler only. The overall system efficiency will depend in part on the efficacy of the intervening thermal switches. We propose to develop a highly effective, innovative prototype thermal switch that combines two recently developed technologies. First, it employs a highly conductive thermal contact at a low applied force. Secondly, the heat switch employs an innovative bi-stable actuator. The actuator requires little energy to switch between states and can achieve motion on the order of millimeters. This available motion exceeds the tens to hundreds of microns needed to engage the contact, enabling complete separation, and thus, excellent thermal isolation in the off state. Combining the inherently high on- and low off-conductance of the contacts with the bi-stable actuator positioning provides for a highly effective, innovative thermal switch, potentially enabling significant performance enhancement of NASA missions.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Atlas Scientific	Supporting Organization	Industry	San Jose, California

## Primary U.S. Work Locations

California

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

James Maddocks

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - └ TX14.1 Cryogenic Systems
    - └ TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors